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ABSTRACT

Wildlife is often described as one of Alaska's most important and valuable resources. Helping wildlife can take many forms. In this educational packet, a variety of activities are included to help secondary school students understand which human activities help wildlife and which harm wildlife. In addition, suggestions on planning hands-on projects to improve wildlife habitat or to become involved in decision-making about Alaskan wildlife issues are included. The activities included in this packet represent adaptations and combinations of activities from past years and from Project Wild under the unit theme "Together, We Can Help Wildlife." The four lessons included in this guide contain background information for teachers, introductory activities and ideas for curriculum integration. Examples of Alaskan food webs and food chains, game pieces, seven sets of instructions for investigating different kinds of wildlife, and "Etiquette for Wildlife Watchers" are included in an appendix. (CW)

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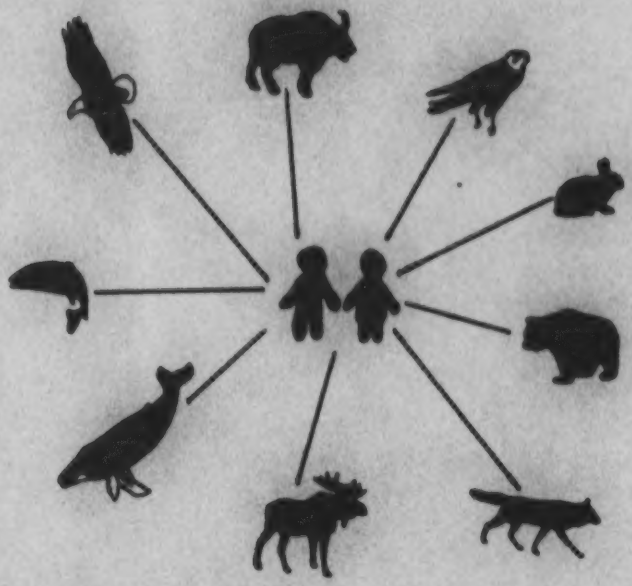
Alaska Wildlife Week

Junior/Senior High School Teacher's Guide



Unit 7. Together, We Can Help Wildlife. **April 23-29, 1989**

Alaska Department of Fish and Game -- Division of Wildlife Conservation
Nongame Wildlife Program

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Alaska Wildlife Week 1989

INTRODUCTION

Wildlife is often described as one of Alaska's most important and valuable resources. But few people think of wildlife in such general and somewhat remote terms. "Alaska wildlife," instead, is, first and foremost, the wild animals you and your students encounter on a daily basis as you wake up to warblings and chirpings in spring, or you ski or dog mush across a variety of tracks through the snow during winter. If, like many Alaskans, you hunt, trap, or fish; then you have necessarily learned something about the ways of the animals you pursue as well as the types of areas where you are most likely to find them. Or you may be inspired to bring home a particularly beautiful shell, or a take a photograph, or to create artwork from your memory of a particularly beautiful wild animal or scene. Most Alaskans have personal experiences with the wildlife species that live in Alaska. The areas where we live and recreate are shared with wildlife. Many depend upon fish and wildlife to some degree for food or clothing or the source of materials for artwork and handicrafts. The 1989 theme, "**Together, We Can Help Wildlife**" celebrates the fact that many Alaskans are aware of and are participating in activities that benefit wildlife directly or indirectly.

Helping wildlife can take many forms. In this educational packet, a variety of activities are included to help students understand which human activities help wildlife and which can harm wildlife. In addition, some "how-tos" on planning hands-on projects to improve wildlife habitat or to become involved in decision-making about Alaskan wildlife issues are included. Finally, a list of many resources is available to help your class get started on a particular type of project.

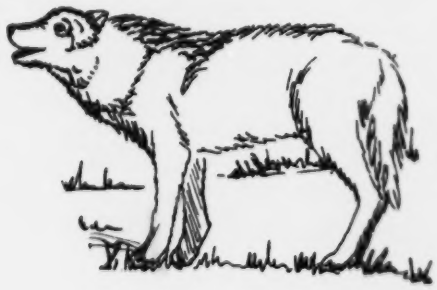
This year for the first time since Alaska Wildlife Week was initiated in 1983, we have not created a new packet of materials. Rather, we have **combined and adapted activities from past years** and from the Project Wild curriculum into a unit with the theme, "Together, We Can Help Wildlife." We hope that many of you have integrated past Alaska Wildlife Week materials into your curriculum so you can use this year's ideas as a means to **extend** and **reinforce** basic concepts about Alaska ecosystems and management of Alaska's fish and wildlife. We have included several ideas for doing so for each activity and referenced the sections of the previous Teacher's Guides that provide background information for the teacher and introductory or additional activities. We encourage you to review these sections if you decide your students need additional preparation to make the best use of activities included in this year's unit. We are working to make more copies of past units available; in the meantime, check your school libraries for copies.

The Alaska Wildlife Week series now includes units related to ecology and ecosystems in general (Unit 4 - We All Need Each Other) and to three major Alaska ecosystems of Wetlands (Unit 2 - Water, Wetlands, and Wildlife), Forests (Unit 5 - Alaska's Forests ... more than just trees), and Tundra (Unit 6 - Alaska's Living Tundra); and units related to major wildlife management concepts of habitat (Unit 1 - Be It Ever So Humble ... there's no place like habitat) and wildlife population dynamics (Unit 3 - Wildlife for the Future). As we have noted in the Teacher's Guides, many of the activities developed about one Alaska ecosystem can be adapted for use for the ecosystem with which your students are most familiar, although we encourage you to continue to teach the students in Barrow about Alaska's coastal forests and the students in Ketchikan about tundra. The general concepts are applicable in every ecosystem and form the basis for the understanding of **how** human actions truly affect wildlife.

The Teacher's Guides are organized so that the lessons build upon those previous. The student skills and the subjects are noted to allow for curriculum integration. All the activities were designed to help students develop or improve skills and knowledge in science, social studies, language arts, math, and/or art. Easy-to-duplicate worksheets may be used to review, reinforce, or evaluate student understanding of the lessons in this unit.

Please feel free to adapt and modify activities and worksheets to best suit your teaching style, students' learning styles, and your location and situation. Three separate Teacher's Guides were prepared -- one for Primary (K-3), Upper Elementary (4-6) and Junior/Senior High School. Check to be sure you have the one that best matches your students' knowledge and thinking skills.

We hope you will use these materials during Alaska Wildlife Week in 1989, as well as throughout this and other years. Please send any comments or suggestions about this project to: Alaska Wildlife Week, Alaska Department of Fish and Game, Division of Wildlife Conservation, P.O. Box 20, Douglas, AK 99824.



Unit 7. TOGETHER, WE CAN HELP WILDLIFE

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LESSON 1

Students will learn that human actions can affect wildlife and ways that human activities can help or harm wildlife.

BACKGROUND. Helping wildlife can take many forms. Human actions can benefit wildlife if they benefit individual animals, individual species, an ecosystem in which wildlife is a part, or if they help maintain global conditions upon which wildlife depend. While many activities are specifically undertaken to actively help wildlife, other actions that maintain conditions suitable for wildlife or avoid harming wildlife are equally important.

Helping Individual Wild Animals

You and your students are probably aware of things that people do or have done to help individual wild animals. The well-publicized rescue of three gray whales trapped in the ice at Barrow in fall, 1988, is a dramatic example of the large amount of human concern about the perceived suffering and imminent death of individual wild animals that could be prevented by human effort. People often try to care for sick or injured wild animals, many of which are hurt as a result of human actions such as wounding gunshots or litter that entangles or poisons. Millions of people in the U.S. feed birds year-round. When you first ask your students to think of things that help wildlife, they will likely list actions that help individual animals.

Often, humans help individual wild animals by the things they don't do, rather than by the things they do. When people encounter wild animals, they can easily disturb them with noise, chasing, or by just approaching more closely than the animal can tolerate. Tolerance for human activity differs for the raven that lives close to humans and learns quickly to feed on human garbage to the wolf which requires large expanses of wild lands. Nearly all wildlife species have periods in their life cycle when they are more sensitive to disturbance, usually during breeding or raising their young.

Helping Wildlife Populations

Many people are engaged in wildlife research, either as a volunteer or as a career. While they often work with many individual animals, they are generally concerned with **populations** of animals in relation to the desires or needs of people who use fish or wildlife. When people desire or need to harvest animals through hunting, trapping, and fishing; then the efforts of researchers and managers are directed at monitoring or ensuring that sufficient

numbers of animals are available over time to meet the demands. Similarly, when humans want to view or enjoy wildlife in ways that don't require harvesting (e.g., viewing, photography), then efforts are directed at maintaining this use, by monitoring and regulating human activity so that sensitive species are not displaced or disturbed. When human demands exceed what populations can sustain, then decisions are required to allocate wildlife populations to satisfy some, but not all, of those demands. In some cases, people can do things that result in increases in wildlife populations, such as rearing fish in hatcheries.

Your students may be less familiar with the concepts involved in managing wildife populations.

Unit 3 of Alaska Wildlife Week (Wildlife for the Future) focuses on these concepts. Several activities from Unit 3 are included in the Upper Elementary and Junior/Senior High versions of this packet. For additional teacher background, please refer to the Teacher's Guide for Unit 3.

The Importance of Habitat

The paramount factor in the potential or maximum size of wildlife populations is the amount of suitable **habitat** that exists. One way to think of a fish or wildlife population is in terms of a pie. A portion of the pie must remain after all the factors which cause deaths, including human actions, occur; in order to replenish the population through reproduction and births. But if the population is the pie, the habitat is the pie tin which ultimately limits the maximum size the population habitat's **carrying capacity.** Maintaining habitat quantity and quality is the key to healthy and abundant fish and wildlife populations.

Habitat is the scientific term for an animal's home. An animal's habitat includes **food, water, shelter,** or cover, and **space**. Because animals need food, water, shelter, and space to be available in a way that is suitable for their needs, we say that these things must be available in a **suitable arrangement**.

For ideas on how to present the concept of habitat to your students, refer to Unit 1 of Alaska Wildlife Week or Project Wild activities such as **The Beautiful Basics, Everybody Needs a Home, Habitracks,** and **What's That, Habitat?**

Unfortunately, many things people do harm wildlife by reducing or degrading habitat. Some of these activities may be necessary to meet other human needs for housing, food, or places for commercial or industrial development. People can help wildlife by considering the effects of all human actions on fish and wildife and minimizing damage or loss of habitat as much as possible. In some cases, the benefits of maintaining

habitat outweighs the benefits of the activities that will degrade it. People play an important role in participating in political land-use decisions which weigh competing demands for publically-owned lands.

People also do things to improve habitat, such as building fish ladders so fish can migate up steep sections of rivers to suitable upstream habitat or building nest boxes for birds to increase the amount of nesting habitat. Other habitat improvement projects occur after habitat has been degraded by previous human actions. As examples, streams are restored after being damaged by logging or construction of roads or pipelines. Nest boxes are built for birds after natural nesting habitat has been reduced. However, it's important to understand that current efforts to improve or restore degraded habitat in no way equals or compensates for the large-scale habitat alteration and loss that occurs from many human activities.

<u>Fish and Wildlife as Ecosystem Partners</u>

A single species' habitat involves other living things. For example, plants can be food items, shelter from wind, or a safe hiding place from predators. Many species are interrelated and interdependent in **ecosystems**.

Very simply, the critical relationships of ecosystems involve the question of "who eats whom?" Food chains or webs are formed by these relationships. (A listing of "Alaska Food Chain and Food Web Examples" is included in Appendix 1 of this unit for reference in carrying out the activities using animals that your students are familiar with.)

Large-scale human development activities and even small-scale human activities can affect the entire ecosystem of which wildlife is a part. One objective of this unit is to help your students understand that many things people do affect wildlife indirectly by affecting seemingly unconnected ecosystem components. The ecosystem is also a pie tin, which contains the collective habitat or home of interconnected living things and their non-living support system.

Unit 4 of Alaska Wildlife Week (Web of Life) contains teacher background information and many activities to teach food chain and food web concepts. Four Alaska Wildlife Week units include teacher background and activities about ecosystems in general (Unit 4) and specific Alaska ecosystems: Wetlands (Unit 2), Forests (Unit 5) and Tundra (Unit 6). The Aquatic Project Wild Guide includes a "Guide to the Ecosystem Concept." With the use of these previous materials, activities in this unit about helping wildlife can be used as extensions to a unit on one of the Alaska ecosystems.

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ETHI-THINKING

OBJECTIVE:

Students will generate a list of activities that can help or harm wildlife

Subjects: Social Studies, Science, Language Arts
Skills: Analysis, description, discussion
Group Size: any
Setting: Indoors or outdoors
Key Vocabulary: harm, wildlife

Background:

This introductory activity can be used, with little preparation, to have students begin thinking about how human activities affect wildlife or it can be used as a review after your class has completed lessons from other Alaska Wildlife Week units. If you are studying a specific Alaska ecosystem (forest, tundra, wetland, ocean), then discussion and this unit can be geared to the human actions that occur in that ecosystem. The introductory activity in Lesson 3 (page 25) reviews and extends this lesson.

PROCEDURE:

1. HAVE STUDENTS THINK OF THINGS THAT PEOPLE DO THAT AFFECT WILD PLANTS OR ANIMALS. Encourage students to "brainstorm" activities that people do that might affect wild plants or animals and decide whether it helps or harms them.

Examples of helpful things might be:
- Feeding birds during winter
- Caring for sick or injured animals
- Leaving bird nests alone

Some examples of harmful activities might be:
- Driving vehicles on wetlands or tundra
- Littering
- Picking up baby animals
- Chasing or scaring animals

2. WRITE THE ACTIVITIES DOWN AND KEEP THEM FOR USE IN LATER ACTIVITIES.

3. EXTENSION: HAVE STUDENTS THINK OF THINGS PEOPLE DO THAT AFFECT A PARTICULAR ECOSYSTEM (FOREST, TUNDRA, WETLAND, OCEAN).

ADAPTED FROM: PROJECT WILD "ETHI-THINKING," and ALASKA WILDLIFE WEEK, UNIT 5.

OBJECTIVES Students will learn that human activities can help or harm populations of wildlife by:
1) directly reducing habitat components of food and cover,
2) as a function of their cumulative effects on wildlife populations.

Three activities that can be integrated into your curriculum are included in this lesson. **Brant for the Future** and the **Caribou Game** integrate both objectives. **Wildlife and Harvest** focuses on the second objective from the perspective of wildlife harvest. The first two activities are included in the Games Book, included in this packet.

BACKGROUND: For an introduction to factors affecting wildlife population dynamics, show the film/tape program, "Wildlife for the Future." Check your school library or the state film library for a copy. The Population Puzzles included in the Games Book, Unit 3, provide simulations of how wildlife researchers and managers learn about populations and arrive at solutions to problems.

Arctic-nesting species of brant and other geese are currently at very low levels. A curriculum which combines and adapts activities from Alaska Wildlife Week, Project Wild, and other curricula has been developed to teach students about the issue involved and ways to help rebuild the geese populations that nest on the Yukon-Kuskokwim Delta of Alaska. Contact the U.S. Fish and Wildlife Service,1011 E. Tudor Avenue, Anchorage, AK 99503 for additional information about the Teach About Geese curriculum

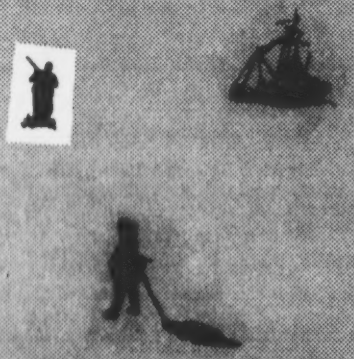
Other extensions from Project Wild: **Migration Headache, Hooks and Ladders,** and **No Water Off a Duck's Back** (effects of oil pollution on feathers).

PLAY "BRANT FOR THE FUTURE" GAME

Specific Objectives: 1. Students will learn that decisions about wildlife use and habitat development have a cumulative effect on wildlife populations by a simulation involving the cumulative effects, of decisions made by people throughout the summer, winter, and migratory range on a population of brant geese.
2. Students will practice addition, subtraction, multiplication, and division skills by calculating changes in a population size.
3. Students will practice graphing information and interpreting graphs, by working together on a graph of population changes.

THE CARIBOU GAME

BACKGROUND: This activity illustrates the population dynamics of caribou herds and the factors which affect the number of deaths and births in the population each season. The game can be played for several rounds representing successive years to simulate cumulative effects of changes in population size. A broad range of human activities with effects on the population are included: entanglement, research, disturbance by airplanes, development and loss of habitat, legal and illegal harvest, diseases introduced by livestock, and train and car accidents.



PLAY THE WILDLIFE AND HARVEST GAME

Specific Objective: Students will recognize that harvest of fish and wildlife must be limited to protect wildife populations.

BACKGROUND: This activity simulates the effects of unlimited harvests, permit hunts, and illegal harvests. Any animal that is regularly harvested by hunters or fishermen can be used as the example (Make copies of Wildlife Cards from previous Alaska Wildlife Week Units).

WILDLIFE AND HARVEST . . . . . SOCIAL STUDIES / SCIENCE

OBJECTIVE: Students will recognize that harvest of fish and wildlife must be limited to protect wildlife populations.

BACKGROUND: This activity simulates the effects of unlimited harvests, permit hunts, and illegal harvests.

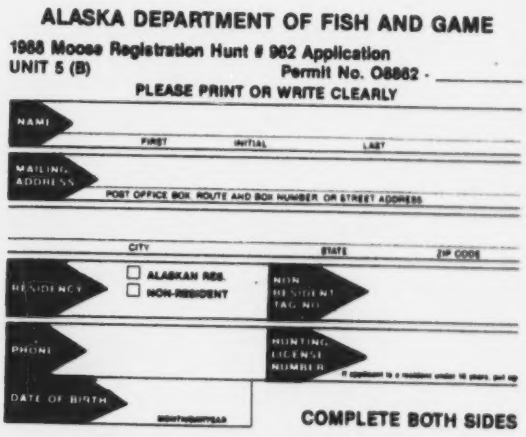
SKILLS: Counting, reasoning, applying scientific knowledge to a social question

MATERIALS: 50 cards showing an animal that is harvested by humans (Photocopy one of the Wildlife Cards from Alaska Wildlife Week units.), a number of slips of paper equal to the number of students in the class with 3/4 labelled "This is not a permit," and 1/4 labelled "Hunting Permit--You may harvest 2 animals," and additional slips of paper labelled "This is not a permit. You harvest 2 animals anyway."

Procedure:

Preparation: Tape a number of wildlife cards equal to the number of students in the class onto a simple sketch of an ecosystem drawn on the blackboard.

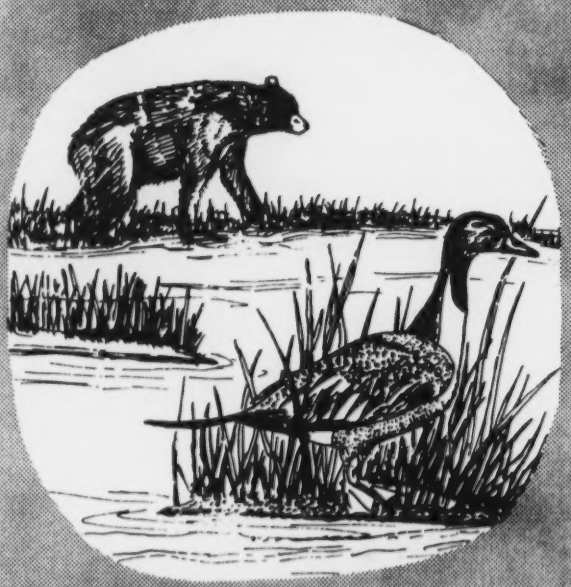
1. STUDENTS HARVEST ANIMALS. Ask students to pretend they are hunters or fishermen, and come harvest an animal from the ecosystem. Each student should come up and take one. Discuss what happened. Have students return the animals to the board.



2. STUDENTS RECOGNIZE THE NEED FOR LIMITS. Ask how the consequence of unlimited harvest could be avoided. Can students decide that humans must limit the number of animals they harvest? If humans do limit the harvest adequately, animals may survive to raise more young, and replace the animals that were harvested by people. Explain that is why hunters and fishermen must get a license and take only the number of animals that the license allows. If too many people want to harvest animals, we have to limit the number of hunters by only giving out a certain number of permits. The Alaska Department of Fish and Game does this in some cases by a drawing.

2. STUDENTS HOLD A "PERMIT HUNT." Have students count the number of animals on the board (in a population). Then, have each student draw a slip of paper from the jar. Only those who receive a harvest permit are allowed to take an animal. Ask the permittees to do so, then have all the students return their slips to the jar. Then explain that half of the remaining animals are females, and they each produce one young the next spring. Place additional cards on the board to represent the young. Ask students to count the number of animals on the board now. (It should be the same as before.) Discuss why.

4. ILLEGAL HUNTERS TAKE EXTRA ANIMALS. Have students hold another permit hunt (but this time add the slips that instruct certain students to harvest illegally.) Repeat the above step--count number present, hold a harvest, show the results of animals reproducing, then re-count the number present. What happened? (The number should have dropped.) Can any students explain why there aren't as many animals as before? If desired, repeat this process 2 or 3 times to show the inevitable decline in numbers of animals. Ask students whether or not they think it is important to obey hunting and fishing laws, and why. Do they understand the consequences of people not obeying the laws?



EXTENSIONS

If you are studying tundra ecosystems or using them as your examples, the "TUNDRA CONNECTIONS GAME" (Unit 6, Alaska Wildlife Week) has objectives similar to that of this activity. It can be modified to fit the ecosystem you are studying.

Ecosystems and People ..... Science, Social Studies, Art

OBJECTIVE: Students will recognize that humans are interdependent with other living things.

BACKGROUND: This activity builds on the concept of an ecosystem with many interacting parts, both non-living and living. Teacher background information and activities that teach your students to distinguish between non-living and living things are included in Unit 4 of Alaska Wildlife Week materials along with background and activities to introduce ecosystem concepts and many Alaska-specific examples. Additional activities and examples are included in Units 5 for Alaska's forest ecosystems and 6 for Alaska's tundra ecosystems.

PROCEDURE:

1. DISCUSS THE CONCEPT THAT ALL LIVING THINGS HAVE AN EFFECT ON OTHER LIVING THINGS THAT LIVE IN THE SAME ECOSYSTEM.

Have students give some examples. All the living things in an ecosystem are sometimes called a community -- the same word that is used to describe a group of people that live in the same area. Ask students whether or not humans do things that are important for other people that live in the same community. Have students name as many jobs done by people as they can think of (baker, teacher, garbage collector, house builder, etc.). List these in Column 1 on the blackboard. Label Column 2 "Non-living Things" and Column 3, "Living Things." Then, go through each job listed and discuss whether the person doing the job needs things from the non-living environment (if so, list these in Column 2) or other living things (if so, list in Column 3), in order to do their job. When finished with this, ask students whether they think their human community could survive without the surrounding ecosystem. They should recognize that most of the jobs people do require things from the non-living environment or other living things -- i.e. ecosystems.

2. DISCUSS THE DEPENDENCE OF PEOPLE ON OTHER LIVING THINGS.

Ask the students whether there are any jobs done by living things in the ecosystem that people can't do. They should think of things like making oxygen and food, changing waste materials back into minerals (we do this with some materials by burning them), making soil, wood, rubber, and certain medicines. Students should recognize that humans are dependent on other living things for food, oxygen, mineral recycling, and materials for building. Are humans part of ecosystems?

3. REVIEW THE LIST OF THINGS PEOPLE DO THAT AFFECT LIVING AND NON-LIVING THINGS:

How many of the activities affect something that people depend on in some way? Students should recognize that everything humans do can affect living things. Discuss and compare the effects of one person doing a certain activity, and 100, 1000, or 4 billion doing that activity.

LESSON 2

Students will learn to evaluate changes in ecosystems that result from human actions.

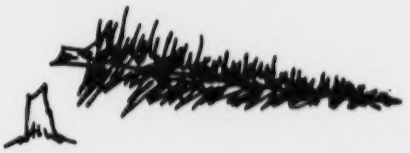
BACKGROUND. Lesson 1 was designed to **introduce or review** concepts of wildlife habitat, food chains, and ecosystems and to have your students begin thinking about how humans can affect wildlife. The second lesson provides activities for the students to begin observing changes in food chains and ecosystems that result from human activities and **evaluating** the changes in terms of what they might mean for wildlife and for humans.

The many inter-relationships between living things, and between living things and the non-living environment make ecosystems both resilent and fragile. Any change in the non-living surroundings, or in a population of any living thing, is likely to cause many other changes within an ecosystem. Changes in the non-living surroundings can affect all living things, because all use air, water, and minerals, and are affected by temperature, humidity, and light. A change in a population of one living thing will affect the populations of all the other living things it interacts with--through food chains and webs, or other kinds of interactions. The resulting changes in these populations, may in turn, affect the populations of all of the different living things these interact with. This chain reaction of changes means that a single change--in the non-living surroundings or in the population of a single kind of living thing--can indirectly affect many, or all, the living things in that ecosystem.

Ecosystems can and do tolerate and absorb changes in the non-living environment (such as weather and climatic changes, earthquakes, floods, etc.). Ecosystems can also tolerate and absorb changes in the numbers and kinds of living things present; extinction of certain species and invasion by others are natural and, over geologic time, constant occurrences. All ecosystems are in a state of constant change.

However, too many or severe changes in either the non-living surroundings, or the populations of living things can causethe many complex relationships in an ecosystem to be disrupted permanently. While such change may make the area uninhabitable for its present residents, species suitably adapted to the changed environment may colonize and become established. A new ecosystem may thus appear, often after a long period of time, with a whole different community of living things interconnected by different food webs and symbioses.

Nearly every human activity affects ecosystems. Each change may have desirable or undesirable consequences. The important thing to recognize is that every activity has potential consequences and to learn how to evaluate those consequences. Even an activity that seems only to affect insects, or fungi, the upper atmosphere, or ground water supplies can have far-reaching consequences.



PEOPLE AND ECOSYSTEMS - A FIELD INVESTIGATION

..... SCIENCE / SOCIAL STUDIES

OBJECTIVES:
Students will look for evidence of human activities and recognize that human activities affect ecosystems by comparing areas with and without human disturbance.

PREPARATION: **Pond Succession**, from the Project Wild Aquatic guide, is a good activity to introduce the concept of ecosystem succession. See also the **Succession Game** in Alaska Wildlife Week Unit 5 (Alaska's Forests), Upper Elementary Teacher's Guide.

SKILLS: observation, comparison, field techniques

MATERIALS:
Pencils, field notebooks or paper, clipboards or cardboard for a writing surface, equipment to carry out investigations (see Appendix), two outdoor sites -- one undisturbed site and one affected by human activities (a playground, parking lot or lawn is adequate, but you may want to choose a site that is affected by an activity such as logging, mining, litter, or agricuture; in a tundra or other type of wetland area, this could be a vehicle trail). Be careful not to compare a wet and dry site, or two sites with different aspects or slopes as these will vary due to factors other than human activities.

PROCEDURE:
1. STUDENTS INVESTIGATE AN UNDISTURBED SITE: Divide the class into teams and assign each team a component of the ecosystem to investigate: non-living surroundings, monerans and protists, fungi, animals in the soil, plants, birds, mammals, animals in the water; using the techniques in the "Ecosystem Investigation" section of the Appendix (reprinted from Alaska Wildlife Week, Unit 4). Have the students record their observations.

2. STUDENTS INVESTIGATE A DISTURBED SITE: Have students divide into teams again and perform the same investigations that they did at the undisturbed site.

3. STUDENTS COMPARE THE NUMBERS FROM THE TWO SITES: Use the numbers that the groups recorded to fill out an Ecosystem Investigation Sheet for each group. Then, have students make bar graphs of the numbers of kinds of plants, animals, and fungi at each site. Ask students which site was more interesting, or had the most variety of living things. Have them compare the differences between the disturbed and undisturbed site in terms of the relative number of species, different types of species, and densities of each species observed. (Sites that have been disturbed severely should have fewer types or lower densities, but less disturbed sites may have high densities of a few "weed"-type species.) Ask them why some types of plants or animals are found only in disturbed or undisturbed sites, but not in both. Can they explain why?

ART EXTENSION:

Take a large sheet of drawing paper (11 x 17) in the field. Have students fold it in half to form two 8 1/2 x 11 sheets; label one-half "A Wild Ecosystem" and the other side "The Ecosystem after Humans Changed It."

Have students observe each site and draw and color:
1) the non-living surroundings (try to get the exact color of the sky, the air, the water, and the soil),
2) the producers,
3) animal consumers (use your imagination to draw in pictures of the animals of which you only found signs) and
4) fungi.

Discuss the differences in the color of the air, water, and soil at the two sites.

SCIENCE EXTENSION:

Have the students try to construct food chains and webs for each of the sites and estimate the relative number of producers, herbivores, carnivores (2nd and 3rd order carnivores, omnivores, and detrivores at each site. Which has the most variety of each group? Does any group of consumers make up a greater proportion of the living things in the disturbed site? (omnivores may because they are more able to adapt to changes in the food web). What differences are there in the two ecosystems ?

FAVORITE ANIMAL . . . . . SCIENCE / SOCIAL STUDIES

OBJECTIVE:
Students will learn that in order to protect any kind of wildlife, we must protect their non-living surroundings and all the other living things they depend upon.

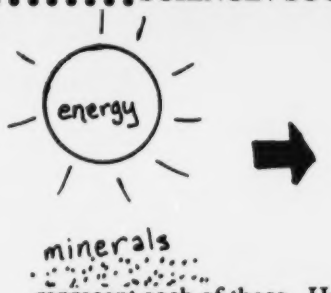
MATERIALS:
Large open area with grass or carpeting; reference materials on wildlife (may be able to do without).

BACKGROUND:
For this activity, you can use an animal that lives in your area or one from a specific Alaska ecosystem that your class has studied or is studying. See the appendix for food chain and food web examples from Alaska ecosystems.

PROCEDURE:
1. ELECT A FAVORITE ANIMAL:
Have the class nominate animals for the title "Our Favorite Animal," then take a vote to choose one.

2. DESCRIBE THE ANIMAL'S ECOSYSTEM AND ASSIGN PARTS TO STUDENTS:
Assign 2 or 3 students to represent the favorite animal. Have the class list the parts of the non-living surroundings that their favorite animal needs--assign one student to represent each of the parts.

Have the class name the living things their favorite animal eats (write these on the board)--assign students to



represent each of these. Have students list 2 things eaten by each of these animals (again write on the board), and assign students to represent those. Have students list 2 or 3 living things that make the oxygen needed by their favorite animal; write these on the board and assign one student to represent each one. Determine if there are other living things that help any of the living things so far listed (don't forget pollinators, seed carriers, etc.). List these on the board, and assign students to represent them.

3. CHOOSE THE LEAST POPULAR LIVING THING:
Have the class choose the least popular living things listed (or have the class vote on their least favorite animal--from those listed on the board.) Ask the class if they think it would matter if people did something that caused the unpopular thing to die out. (For example, if humans spread a poison that killed that organism, or destroyed its habitat).

4. PLAY A GAME:

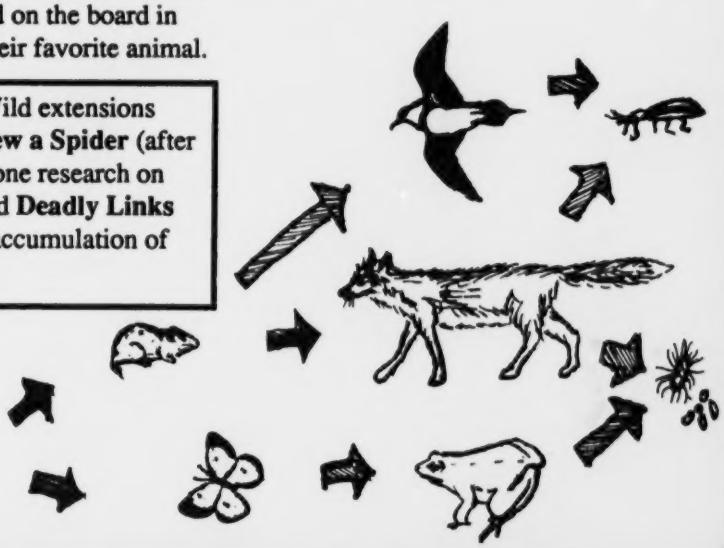
Explain that they are going to play a game to find out. Have students stand (or squat) in a circle on the grass or carpeted area. They represent parts of an ecosystem--but they are not yet an ecosystem, because they are all standing alone. In order to represent an ecosystem, they all must become interdependent. Ask them to place their hands on the shoulders of the person next to them. Then everyone should take a step toward the center of the circle and take the hand of the person just beyond the person next to them. (Hands should be grasped behind the back of the person next to each student.) Then have everyone lean back, knees straight, and walk their feet in toward the center. Then ask the student representing the unpopular living thing to let go. What happens? Was their favorite animal affected? Have the class discuss why we would need to protect all the living things listed on the board in order to protect their favorite animal.

Other Project Wild extensions include **Interview a Spider** (after students have done research on their animal) and **Deadly Links** (food chain bioaccumulation of pesticides).

ART EXTENSIONS:

Have the class make bumper stickers that say: **Help save** (name of their favorite animal), **Protect** (name of their least favorite living thing). Or have the class adopt the unpopular species. (Instead of adopting whales--adopt amphipods. Or instead of adopting hawks--adopt voles), Students can make posters, write poems, paragraphs, or banners declaring the importance of their unsung wildlife hero. Also, see the Project Wild activity **Cartoons and Bumper Stickers.**

Help save the peregrine falcon....
Protect Craneflies!



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LESSON 3

OBJECTIVE:

Students will develop a sense of personal responsibility for helping wildlife and avoiding or minimizing actions that harm the environment.

BACKGROUND. This unit is designed to allow students to apply the awareness gained from evaluating how human actions affect wildlife and the ecosystems upon which they depend. One introductory activity re-visits Ethi-thinking, the activity that introduced Lesson 1. The second introductory activity brings a resource manager to your classroom to describe "real-world" actions and potential careers working with wildlife. Subsequent activities are designed to make your students identify alternatives to actions that harm wildlife, including developing a personal code of ethics and becoming a "friend of the ecosystem."

This lesson can prepare the students for Lesson 4, where the class takes on a wildlife-related issue or project. The index that follows Lesson 4 lists many specific issue or project-related activities from previous Alaska Wildlife Week materials. You may wish to review these if you plan to direct the activities in this lesson towards a specific issue or project.

For more background for you as the teacher about problems of use and conservation of specific Alaska ecosystems, refer to the following sections in past Alaska Wildlife Week materials:

Alaska's Wetlands: Water Pollution and You, page 33 and Table 1, Some Effects of Water Pollution on Wildlife, pp. 50-53, Unit 2, Teacher's Guide

Alaska's Forests: Unit 5, Lesson 5, pp. 65-68, Jr./Sr. High School Teacher's Guide

Alaska's Tundra: Unit 6, Lesson 5, pp. 68-70, Jr./Sr. High School Teacher's Guide

ETHI-THINKING, REVISITED

OBJECTIVES:

Students will 1) apply their evaluations of the effects of human activities on ecosystems to revise their list of activities that humans do that are helpful or harmful to wildlife, 2) discuss reasons why harmful activities are inappropriate, and 3) recommend alternative activities that are not harmful.

Subjects: Social Studies, Science, Language Arts
Skills: Analysis, generalization, description, discussion
Groups Size: Any
Setting: Indoors or outdoors

BACKGROUND:

This activity can be used to review and extend the initial concept of helping and harming wildlife. It is also a good introductory activity for the activities in this unit.

PROCEDURE:

1. REVIEW THE LIST OF ACTIVITIES FROM THE "ETHI-THINKING" IN LESSON 1:

Ask the students if they have changed their mind about any of the activities that they listed as helping or harming wildlife. Can they think of others?

2. DIVIDE THE CLASS INTO GROUPS AND PASS OUT THE HUMAN ACTION CARDS THAT SHOW ACTIVITIES THAT CAN HARM WILDLIFE:

Count students off into groups of 4 each. Hand out one card to each group. Ask them to discuss:
- What is happening?
- Could it harm wildlife? How?
- Does it seem appropriate or inappropriate behavior? Why?
- What else could happen that would satisfy human needs without harming wildlife or the environment?

3. HAVE THE GROUPS COMMUNICATE TO OTHER GROUPS:

Ask each group to report to everyone else about their feelings concerning what is happening in the picture and the alternatives they identified. Older students can dramatize their alternatives with skits, "commercials," songs, poems, etc.

Some people drive their vehicles on wetlands, leaving permanent tracks.

Some people are quiet in wetlands, and always careful. They try not to trample plants or scare wildlife.

Some people cut down trees to get wood to heat their homes.

Some people get together to plan how their town or village will grow and use as little of the tundra as possible.

INVITE A RESOURCE MANAGER TO CLASS

OBJECTIVE:

Students will practice listening and questioning skills while becoming more aware of how resource managers help wildlife.

BACKGROUND:

This can also be used as a follow-up to Lesson 3 or as an introduction to "Can Do!"

MATERIALS: A local resource manager to come to your class (students in rural areas could write a letter from the classs to a resource agency instead).

PREPARATION:
The Project Wild activity **Wild Work** is a good preparation for this activity.

PROCEDURE:

1. INVITE A LOCAL RESOURCE MANAGER TO CLASS. Ask a local resource manager to come to your class to dicuss careers related to wildlife, management of wildlife habitat, or other management activities that benefit wildlife. (You could ask someone from the Alaska Department of Natural Resources, the Alaska Department of Fish and Game, U.S. Bureau of Land Management, National Marine Fisheries Service, or U.S. Fish and Wildlife Service.) Ask these individuals to prepare a short talk on the topic and to address the importance of resource conservation, and to be prepared to answer student questions. Ask the manager to mention ways the students can help take care of wildlife or public lands. If you plan to do "Can Do!" project (see the activity in this packet) or a community project to improve wildlife habitat (see **Improving Wildlife Habitat in the Community** in the Project Wild guide) , ask the resource managers for ideas about what your class could undertake.

2. HAVE STUDENTS PREPARE QUESTIONS: Ask each student to write down one question about the management of a specific area or on a specific Alaska ecosystem for which they would like to know the answer, and be prepared to ask this question of the guest speaker.

3. REVIEW PUBLIC OWNERSHIP OF WILDLIFE HABITAT IN ALASKA AND THE JOBS OF RESOURCE MANAGERS: Before the manager speaks, explain that the managers of Alaska's public lands are responsible for making sure that resources are conserved--which means used wisely, or taken care of. They may be wildlife managers, foresters, mining experts, or archaeologists. Discuss why managers need lots of information about ecosystems and must think very carefully about how resources are used. Discuss why managers often make regulations about the use of certain areas or about how wildlife should be treated.

4. SUMMARIZE WAYS THAT STUDENTS CAN HELP MANAGERS TAKE CARE OF WILDLIFE AND ECOSYSTEMS: Help them think of obeying regulations on using an area, and learning more about wildlife habitat needs and ecosystems.

WHAT DID YOUR LUNCH COST WILDLIFE?

Objectives

Students will be able to: 1) trace some foods back to their source, including the impact on wildlife and the environment along the way to the consumer; and 2) recommend, with explanations, some food habits that could benefit wildlife and the environment.

Method

Students trace food sources, diagram environmental impacts, and apply the knowledge they gain by making changes in some of their consumer choices.

Background

NOTE: Especially for younger students, this activity makes a nice summary companion to "What's For Dinner?"

Most of us make lifestyle choices each day that have some impact on wildlife and the environment. Many of those impacts are indirect, and therefore we are not as aware of them as we might be. The choice of foods we eat, for example, is an area with many implications for wildlife and the environment.

The places and ways in which foods are grown has impact. For example, we know that loss of habitat is one of the most critical problems facing wildlife. Habitat may be lost to agricultural use or development as well as to industrial, commercial, and residential uses. Given that people need food, the ways in which we grow that food —and the ways we care for the land in the process—are very important. Farmers can take measures to maintain and improve wildlife habitat as they grow and harvest their crops. They can pay attention to the impact of their growing practices. Both inorganic and organic fertilizers are commonly used in industrial agriculture. These compounds may run off or leach into water supplies. In lakes, for example, this run-off may contribute to a huge increase in the growth of plant nutrients such as algae. This excess growth can act as a pollutant, poisonous to aquatic animal life such as fish, amphibians, arthropods, and insects.

Use of insecticides and herbicides also affects the environment, including wildlife. Obviously, if pesticides kill and eliminate the food source for wildlife, the wildlife either leaves or dies. Indirect effects can include accumulation of such pesticides in the bodies of animals—as in predatory birds, fish, and mammals, including people.

Age: Grades 4—12
Subjects: Social Studies, Language Arts, Science, Home Economics, Vocational Agriculture
Skills: analysis, application, classification, comparing similarities and differences, discussion, drawing, evaluation, media construction, problem-solving, synthesis, visualization, writing (limited)
Duration: one to three 45-minute periods
Group Size: any
Setting: indoors

Key Vocabulary: organic, inorganic, source, renewable, nonrenewable, impact

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Not all of the impact is due to some farmers' practices, however. Certainly, the transportation, processing, packaging, and marketing industries are involved as well. Questions about the natural resources involved in getting the food from its source of origin to the consumer are critically important. One example is increased exploration for and development of fossil fuels used to transport the food from growing site to consumer, used often to fuel the processing, and frequently used in the packaging, as in the case of fossil fuel-derived plastics.

If the students have concern about adopting lifestyle habits that can be healthful to themselves at the same time they have less impact on wildlife and the environment, they can look at the food they eat as one place to begin. The major purpose of this activity is to provide a means for students to begin that process.

Materials

writing and drawing materials

Procedure

1. Ask the students to generate a list of foods they either brought or bought for lunch. Be sure to include any packaging materials the foods came in.
2. Ask each student to pick one food to trace all the way back to its origins—including where and how it grew, was harvested, was transported, was packaged, and was made available to the consumer. . . the student. Ask the students to make simple flow diagrams of the path the food takes. (The students may want to do some research at this point to get some additional information.)
3. Next ask the students to add drawings of possible and likely impacts to wildlife and the environment along the path their food took to get to them.
4. Ask the students to report back to their classmates—using their diagrams as a visual aid as they describe the path taken by their food, and its impact to wildlife and the environment along the way.
5. Ask the students to discuss and summarize their findings.
6. Ask each student to think of one change he or she could make in his or her own lunch-time eating habits that would be likely to have a beneficial—or at least less harmful—effect on wildlife and the environment. Describe the reasoning for this change, and evaluate its consequences. If, after examination, each change seems in fact to be helpful, suggest that the students try making their changes for a week. At the end of the week, ask the students to report back. Were they able to stick with the change? What happened? If they didn't make the change, why not? Did they forget? If they did make the change, did they find themselves making or thinking about any other possible changes? If yes, what were they?

Extensions

1. Map the **energy** used to grow and get the food to you.
2. Include impact on other specified natural resources along the way.
3. Distinguish between renewable and nonrenewable resources.

Evaluation

Trace the possible course of a container of milk served in your school back to its probable source.

What impact does this journey have on wildlife?

Name three food habits that could reduce negative impacts to wildlife and the environment. Explain the reasoning behind your suggestions.

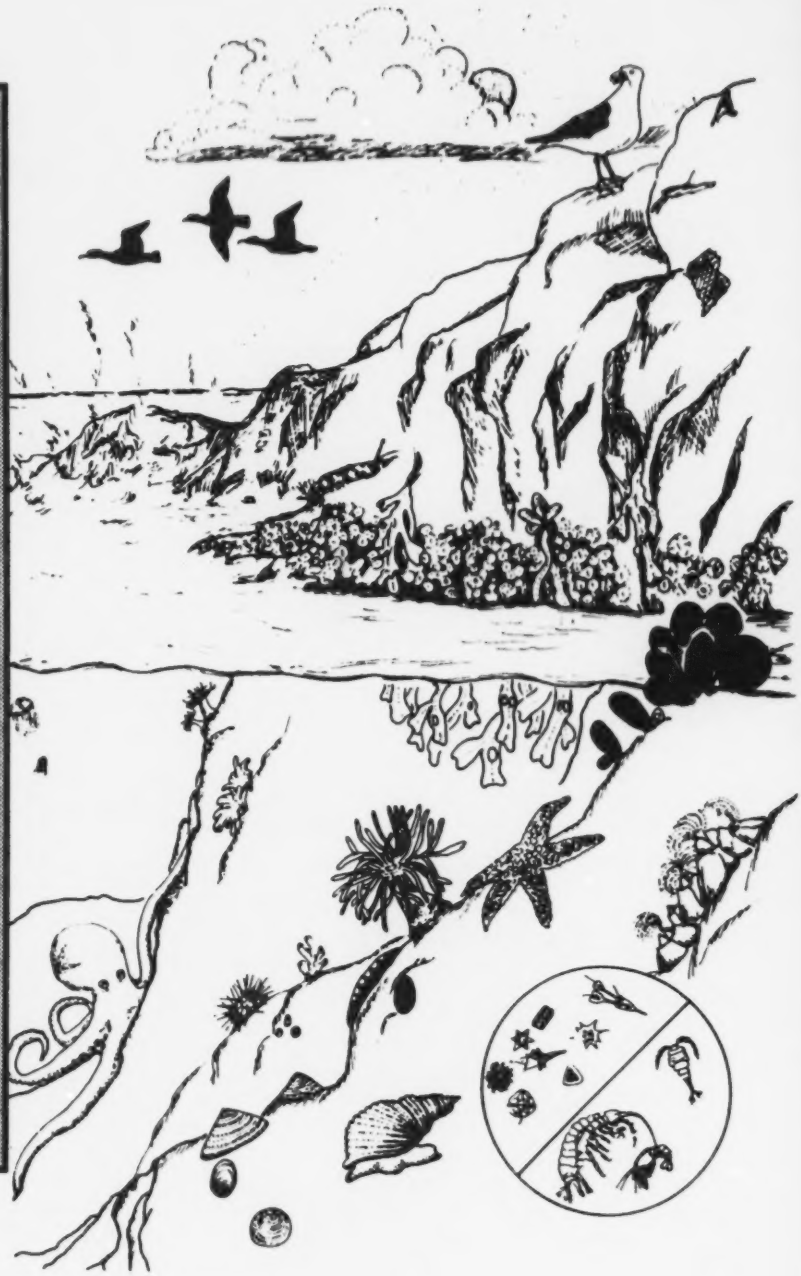
ENVIRO-ETHICS

SEE THE PROJECT WILD ACTIVITY ON THE NEXT PAGE

SCIENCE / SOCIAL STUDIES EXTENSIONS:

If you are keeping or planning to keep animals in the classroom, ask the students to come up with rules that the whole class should follow on how to treat these animals (Refer to the Aquatic Project Wild Guide to see the one developed by the National Science Teachers Association).

If you are planning a field trip, ask them to develop rules for the class on the field trip (Refer to the Appendix for an "Etiquette for Wildlife Watchers" developed by the Alaska Department of Fish and Game).



ENVIRO-ETHICS

Objectives
Students will be able to: 1) distinguish between actions that are harmful and beneficial to the environment; and 2) evaluate the appropriateness and feasibility of making changes in their own behaviors related to the environment.

Method
Students develop and use a "Personal Code of Environmental Ethics."

Background
The major purpose of this activity is to provide students with the encouragement and opportunity to look at their own lifestyles in light of their impact on natural resources and the environment.

Materials
none needed

Procedure
1. Involve the students in discussion about the impact each of us has each day on aspects of the environment—from using electricity to make breakfast to putting on clothes that were derived from some natural resources and transported to us by some means, to use of the varied products we choose and employ each day, to our choices of recreation and entertainment. We are consumers, and our impact is formidable.

Age: Grades 6—12
Subjects: Social Studies, Science, Language Arts, Home Economics
Skills: analysis, application, comparing similarities and differences, description, discussion, evaluation, invention, problem-solving, reporting, synthesis, writing (optional)
Duration: one or two 30—45-minute periods
Group Size: any
Setting: indoors or outdoors

Key Vocabulary: ethics, responsibility, lifestyle

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2. Ask each student to work alone to devise a "Personal Code of Environmental Ethics." This code may be written or not. Emphasize the importance of the code being for the person who creates it. The code should take into consideration daily actions that are harmful to the environment, and those which are beneficial; the students should consciously create their code based on actions they believe are beneficial, or at least not harmful, to elements of the environment. We will always have some impact; we can make choices about the kinds of impacts we make, their extensiveness, etc.

3. Ask for any volunteers to share their "Personal Code of Environmental Ethics." They might share the entire code, or a segment of it. They might describe the thinking that went into the decisions they made in constructing their code. Students might illustrate a part of their code—if they chose not to write it—to convey a major idea. Encourage the students to ask each other questions about the codes, in the spirit of learning more about each person's priorities, but not in a judgemental approach. The purpose is for each student to evaluate his or her own priorities, in a responsible consideration of day-to-day actions that affect the environment, but not to be actively critical of another student's approach to the same problem. In this way, each student is simply encouraged to take responsibility for his or her own actions.

4. Encourage the students to try using their codes, keeping track of how easy or difficult it is for them to live by them. "Progress reports" are appropriate, again in the spirit of each person paying attention to his or her own actions, and bearing responsibility for them.

Variations and Extensions

1. Reflect for a few minutes on your daily life. In fact, close your eyes and follow yourself through a typical day. What natural resources do you use? What choices do you make that have an impact on the environment? If you could, what things—if any—would you change about your daily life in order to have a more beneficial, or less harmful, impact on the environment? What things—if any—do you already do that you think are helpful, or at least not harmful, to the environment? Brainstorm ten words that come to mind when you think of actions and behaviors you value. Create a sentence, paragraph, or poem that might capture the essence of your own "Personal Code of Environmental Ethics."

2. Develop a "life map." It could include where you want to live, whether you want a family, what kind of home, transportation, food sources, job, recreation, etc. Look at the costs and benefits of your choices—for you personally, other people in your community, wildlife, other natural resources, etc.

Evaluation

List five environmental issues.

List one way that you directly or indirectly contribute to an environmental problem.

Identify, describe, and evaluate one way you could lessen your role in contributing to an environmental problem.

Make at least one change in your lifestyle that will reduce your role in contributing to an environmental problem.

FRIEND OF THE ECOSYSTEM.....SOCIAL STUDIES / ART

OBJECTIVE: Students will think about their personal responsibilities to care for Alaska's wildlife and ecosystems.

Materials: None

Procedures:

1. DISCUSS OWNERSHIP OF ALASKA'S LANDS. Ask students what they should do with things they own -- such as a plant, a pet, a yard, or a garden. (They should recognize that they have to take care of these things.) Review the fact that much of Alaska's lands belong to the public -- and that includes them. What should they do since they own much of Alaska's lands?

2. HAVE STUDENTS REVIEW SOME-THINGS PEOPLE DO AND HOW THOSE ACTIONS AFFECT THE ECOSYSTEM: Using the Human Action Cards, have the students determine the things people do that help or hurt the ecosystem. Then discuss whether those things that harm the ecosystem should be allowed, but controlled, and which should not be allowed at all.

3. DISCUSS HOW STUDENTS COULD HELP AN ECOSYSTEM: Discuss whether students do some of the listed activities. Do they do any of the things that help wildlife or the ecosystem? Do they do anything that requires someone else to harm wildlife or the ecosystem? Compare the use of things from the ecosystem that are renewable (e.g., wood, berries) to resources that are not renewable (e.g., oil and gas, minerals). Add a third category to the board: "Things We Must Do Carefully;" help students recognize that some human activities which use renewable resources and which can harm wildlife should be listed in this category (e.g., wood harvest activities).

4. HAVE THE STUDENTS WRITE A "FRIEND OF THE ECOSYSTEM" PLEDGE. Discuss the idea of a pledge (the pledge of allegiance or scout's pledge could serve as examples of pledges). Ask students what they think would be a good pledge for a "Friends of Alaska's Forests Club" (or "Friends of Alaska's Wetlands" or "Friends of the Tundra").

ART EXTENSIONS:

Have students make a button or patch for members of the Friends club.

Lesson 4

OBJECTIVE:

Students will carry out a project to help wildlife or will research and devise a solution to an issue related to wildlife management.

BACKGROUND. This unit includes several ideas for your class to carry out a project that will help wildlife on your school grounds or in your community.

A well-designed class project should enable students to:
1) learn and practice science skills by defining a problem or issue and gathering data,
2) learn and practice citizenship skills by role-playing in political processes that devise solutions, and
3) carry out a "hands -on" class project that is the solution.
The index included in this unit lists the Alaska Wildlife Week activities related to these skills.

Selecting a Problem or Issue

In the process of carrying out an issue-related project, selection of the issue or problem is key. While this unit includes several specific projects which may work for your class, you may need to select a different issue or topic that is relevant to your local community and which can be devloped into a project that is "do-able."

Topics that are both locally important and interesting to the students have the best chance of developing into successful projects. Giving the students a role in selecting the topic can ensure the latter, however you can guide them in selection based on your assessment of the significance of the issue and the information that is available.
(See the index in this unit for past Alaska Wildlife Week materials with information on specific issues or topics.)

One aspect of wildlife-related issues in Alaska is the often high degree of controversy and polarization of opinions within small communities. Locally controversial issues should not be avoided, however, care must be taken to ensure that all views are presented fairly and activities are designed to teach students critical thinking and problem-solving skills, rather than a specific point of view.

Issues vs. Projects

It may not always be possible to select a topic that will provide both issue-oriented activities and a "hands-on" project, particularly if you would like your students' scope of recognition of problems and their problem-solving to extend beyond the schoolyard and community. Even if students can't carry out their "solution," they can gain by learning how to integrate scientific data into social problem-solving situations and by expressing their opinions and conclusions in a variety of ways.

Litter Clean-ups

This year, we are highlighting one significant problem for wildlife, that of litter that can entangle fish or wildlife or be mistaken for food items.

National legislation was passed in 1988 to help control marine litter in our oceans, but solving the problem depends on efforts by citizens to change their habits of disposing of plastic and to clean up plastic that washes up on beaches. An "Ecology Puzzler" (originally printed in Unit 4 of Alaska Wildlife Week materials: Web of Life) is included in this lesson as an activity that is good preparation for a project to initiate or participate in a community beach litter clean-up.

Governor Cowper has declared May, 1989, as "Marine Litter Clean-up Month" in Alaska. Contact your local clean-up coordinator for information on how your class can be involved. If you don't have a local coordinator, pick an area where a clean-up may benefit wildlife and organize your class to carry it out.

Litter is a problem inland as well, particularly plastic litter along streams or in wetlands. Many communities have annual stream clean-ups or general community clean-ups during spring that your students can participate in.

1989 Clean-ups Scheduled:

Kachemak Bay Coast Walk
and clean-up April 29
Contact: Jo Anne Popham 235-6667

W. Prince William Sound June 3-4
June 10-
Contact: Rita Hendrickson 561-1622

E. Prince William Sound early May
Contact Stan Stevens, Cordova

Juneau Beach Clean-up May 13
Contact: Bonnie Lippett 586-8762
Juneau Community Clean-up May 12
Contact: Judy Kennedy 780-4333

Petersburg April 24-31
Contact: Merilee Jones 772-3841

Ketchikan May 5-13
Contact: Tonya Henderson
225-2148

Other Ecology Puzzlers in past Alaska Wildlife Week materials may give you ideas for issue discussions or projects. See Unit 4 (Web of Life), pages 83-92; Unit 5 (Alaska's Forests), pages 31-33; and Unit 6 Alaska's Tundra), pages 71-80. Additional Project Wild activities that may provide potential projects for your class include **Litter We Know** and **Environmental Barometer**.

CAN DO!

Objectives

Students will be able to: 1) identify a problem involving wildlife on their own school grounds; 2) suggest and evaluate alternative means by which to either solve the problem or at least improve the situation; 3) successfully undertake the project; and 4) analyze and describe the process by which they successfully solved the problem or improved the situation.

Method

Students select a school environmental project; conduct research; make plans; and follow procedures to accomplish the project.

Background

Each of us can make constructive contributions to improving the environment in which we live. Sometimes our actions can improve the environment for people, sometimes for wildlife, and sometimes for both Sometimes our effectiveness can be improved if we work with other people—sharing ideas, information, and skills.

A working knowledge of the following terms will be useful to students in this activity:

Problem—a difficult situation to be improved, or an opportunity to make things better. Problems can't always be "solved," but situations can usually be improved.

Authority—an individual or group of people with the power to make changes.

Compromise—a way to settle a problem in which both "sides" usually give a little.

Given that it is important for young people to learn that they "can do" for people, wildlife, and the environment—use your judgement in the course of this activity to assist students in selecting a project that is realistic, constructive, and possible. If not, the students may experience an activity that contributes to their thinking that they "can't do."

The major purpose of this activity is to provide students an opportunity to experience success in taking constructive actions to improve the environment for people and wildlife.

Materials

writing materials

Age: Grades 2—9
Subjects: Social Studies, Language Arts, Science
Skills: analysis, application, description, discussion, evaluation, invention, listing, public speaking, problem-solving, small group work, synthesis, writing
Duration: minimum of three 45-minute periods
Group Size: any
Setting: outdoors and indoors

Key Vocabulary: problem, authority, compromise, constructive, realistic, effective, alternatives

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Procedure

1. Ask the students to think of some ways in which they could improve areas of the school grounds as a home for wildlife. They might generate a list of activities on their school grounds that have a negative impact on wildlife. The list might include litter that poses a hazard for some kinds of wildlife; a muddy area that birds use for water but that has been recommended for blacktopping to minimize dust and mud; a proposed pesticide spraying that will not only kill the "pest" but perhaps affect other plants and animals; removal of a tree that presently helps contribute to cleaning the air, produces oxygen, and serves as a food and shelter source for varying kinds of wildlife, etc.
2. Looking at the list of possible problems and suggestions for ways to improve wildlife habitat at school—ask the students to select one they think they could realistically handle and do something constructive about. If there is difficulty in deciding which one, and reasonable support has been offered for each, the students might vote to decide. Students could also make speeches in support of the project they want to tackle, in hopes of swaying the class vote.
3. Once the project has been selected, ask the students to work alone or in small groups to begin to generate ideas for possible solutions to the problem and ways to implement the project. Each individual or small group could come up with a plan, including a written description and illustrations or sketches of how it will work, and how it can be accomplished.
4. Ask the groups to present their plans to the rest of the students. Students may ask questions for clarification. Once all the plans have been presented, ask the students to select the plan that seems most: a) constructive; b) realistic; c) helpful to wildlife; and d) apt to make a lasting contribution.
5. Also ask the students to select one or more alternative plans, in case their first choice is not acceptable to authorities at the school.
6. Once a plan, with alternatives for "back up," has been selected—ask the students to select a delegation to present their proposal to the school principal or whomever the appropriate authority would be. Remember janitors, groundskeepers, school board, etc.—anyone who would be physically and/or officially involved. A practice session before the students and any interested parents or other groups of students would be helpful. At the practice session, the student delegation would make their presentation as they plan to before the principal, janitor, etc.—responding to any questions from their audience that might be raised.
7. The students should make an appointment to present their proposal, make the presentation, and report back to their classmates. If their plan is accepted, they should make sure they know who to contact next in order to successfully complete their project. Making sure they have all necessary permissions secured, the students should proceed to successfully accomplish their project.
8. Once accomplished, ask the students to analyze their results. Did things work out like they wanted them to? Were there any surprises? Any unforeseen problems? How might they have been any more effective?

For information on which plants to use to attract or benefit Alaska wildife and for landscaping "how tos," see "Landscaping for Wildlife in Alaska," Wildlife Watcher's Report No. 2. This pamphlet is available at Alaska Department of Fish and Game offices, or write to the Nongame Wildlife Program, ADF&G, 333 Raspberry Road, Anchorage, AK 99518.

The next Project Wild activity, Improving Wildlife Habitat in the Community extends the " Can Do!" project into your community. See the Project Wild activity, **Keeping Score**, to identify community needs for habitat improvement.

IMPROVING WILDLIFE HABITAT IN THE COMMUNITY

Objectives

Students will be able to: 1) apply their knowledge of wildlife by describing essential components of habitat in an arrangement appropriate for the wildlife they identify; and 2) evaluate compatible and incompatible uses of an area by people and specified kinds of wildlife.

Method

Students design and accomplish a project to improve wildlife habitat in their community.

Background

NOTE: See "Can Do." Its scope is the school; the scope of "Improving Wildlife Habitat" is the community. "Keeping Score" can be helpful in identifying community needs for habitat improvement, used prior to this activity.

This activity provides an opportunity for students to evaluate and apply much of what they have learned about wildlife and its needs. The major purpose of this activity is to provide students with experience in looking at their own communities; applying knowledge and skills they have acquired; evaluating; and experiencing the possibilities of enhancing their communities as places within which both people and wildlife can live suitably.

Materials

writing and drawing materials, poster or butcher paper OR, model-making materials, like plaster of Paris, clay, small replicas of animals, etc.

Procedure

1. Ask students whether their community could benefit from improved areas for wildlife habitat. If yes, this activity provides a process for helping to make such improvements. If a need is identified, the scope of such a project is a major decision. Habitat improvement projects can be large or small. If a project from this activity is actually to be implemented:
   - It should be within the scope and means of the students to experience success with it; and,
   - It should clearly be of benefit to wildlife and the community.
2. After general discussion, ask the students to divide into groups of four or five. Give each group the task of beginning a design for a habitat improvement project. The project should involve

Age: Grades 4—12
Subjects: Science, Social Studies, Art, Mathematics, Language Arts
Skills: analysis, application, description, discussion, drawing, evaluation, invention, media construction, problem-solving, small group work, synthesis, visualization
Duration: one or two 45-minute class periods if hypothetical; much more time if project is to be implemented
Group Size: any
Setting: indoors (and outdoors, optional)

Key Vocabulary: habitat, improvement

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native plants and animals, and make a contribution to the community. Provide time for the students to discuss and make decisions about:
• What will be its purpose?
• What animals will it serve? Will people be able to visit? Will it be for plants and animals only? What plants and what animals? If people can visit, what will they be allowed to do? What won't they be allowed to do?
• What positive contributions might this improved wildlife habitat area make to the community? What possible problems could arise, if any?
• What costs will be involved? Who will pay? How?
• Where will the area be? How large will it be?
• What are the habitat needs of any animals who will live there? What species of animals can live in the size land area that is available? (Some animals need more room than others and if you are to have a self-sustaining system, you will need a population in an area large enough for successful breeding over time.)
• What herbivores and carnivores might be needed? Predators? Prey? What specific kinds of plants (herbs, shrubs, trees, grasses, etc.) are needed and in what arrangement?
• What will be the water sources? How will air and water quality be maintained?
• What kinds of programs, if any, will be necessary to maintain the area once it has been improved?
• Who must be contacted in order for this project to be undertaken? What permissions would be needed? From whom?
• In balance, is it a good idea . . . for wildlife, the environment, and the people who live in this community?

Optional: Make a site visit.

3. Ask each of the groups to prepare the following: a) a written description of their habitat improvement project, including its location, characteristics, inhabitants, and purposes; and b) a map or model to scale of the area. The map or model can include:
• habitat components for various species
• wildlife living in the area, in their appropriate locations
• bodies of water, natural or made by people
• major areas of vegetation and a key to type
• major landmarks; e.g., rock outcropping, roosts for birds, bare ground, meadows, brush, low trees, high trees
• major food sources and types; e.g., berry patch for birds, prairie dog village for coyotes or birds of prey
• areas developed for human access
• etc.

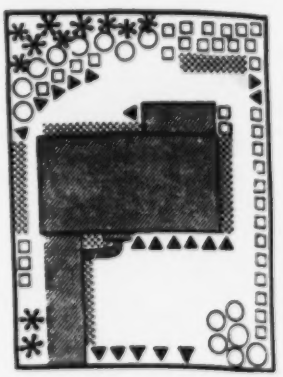
4. Ask each group to display their plans. After all the students have had an opportunity to read the background information and see the map or model of each habitat improvement project, ask the students to talk about what they learned in the process of creating these designs. They can include discussion of problems they encountered, what seemed realistic and what did not, etc. In discussion—and based on their observations of the various proposed projects—ask the students to summarize what seemed to be the most important things to remember about designing such an area (e.g., size appropriate to wildlife, diversity, native elements, appropriateness to community wants and needs).

Extension

Consider the feasibility of designing and implementing one or more of these projects for your community. Do have a local wildlife specialist, and appropriate local officials, e.g., landowners, zoning authorities, critique and cooperate with any proposed project before you get underway with it. Make sure the project is worthy, feasible, and legal—and then proceed!

Evaluation

Rate the following uses of an area as either compatible or incompatible for people and wildlife: houses being built 200 feet from a heron rookery; picnic tables set up in an area heavily populated by squirrels; snowmobile trails through a deciduous forest; swimming beach at a local lake. Think of your own examples. What could be done to make each of these uses more compatible for people and wildlife?

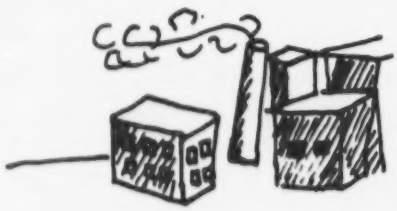


Design a Town • • • • • • • • • • • • • • • • •

3. GROUPS PRESENT THEIR SOLUTIONS TO THE CLASS: After student groups have had adequate time to develop their designs, have each group present their plan to the class. Then, have the class select the best town design. Finally, encourage group cooperation, by having the class work together to improve or polish the selected town design. They can do so by evaluating the side effects of each solution, and figuring out a way to reduce or prevent the undesirable effects. For example: if food is flown in from elsewhere--a side effect might be air pollution from the airplanes. The air pollution might be reduced by having the food brought in by some other means. Or, students may choose to select a totally different solution proposed by one of the other groups. In the end, the class will likely develop a plan that incorporates some of the solutions from all groups.

EXTENSION:

Have students evaluate whether any of their methods of reducing human impacts could be used in their own town. If so, encourage them to develop a plan for how the solution might be implemented in their town. If possible and appropriate, have students present their plan to the proper government officials



ECOLOGY PUZZLER: MARINE PLASTIC POLLUTION . . . . . SOCIAL STUDIES

Objectives: Students will be able to use their understanding of ecology to determine the possible effects of an environmental change.

Materials: Ecology Puzzler

Procedure: Give each individual student or small groups of students the **Ecology Puzzler**. They are to read the facts and try to solve the puzzle at the bottom of the page. Each student or group should write down their answer to the puzzle. Have the individuals or groups present their conclusions. Have the class comment on and discuss the conclusions, then read the section: **What Ecologists have Puzzled Out.**

After reviewing and discussing the puzzle, have students discuss how they might individually be affected by the ecosystem change. How might humans in general be affected? Then, have students discuss what they themselves do that might contribute to the specific ecological problem of marine plastic pollution. Do they throw plastic garbage overboard? Leave old fishing line on the beach or by the side of a stream? Use more plastic than they need? Have students discuss how and whether they individually, or their community, collectively could help solve or reduce this problem.

ECOLOGY PUZZLER

THE FACTS

Plastic is a material made from fossil fuels. It cannot be broken down or decomposed by living things.

Much of the plastic produced begins as small bits or particles which are then shipped to plants around the world for melting and formation into desired plastic products, such as toys, buckets, bags, food wrap, cups, gadgets, etc. Major plastic manufacturers are located in California, and in Japan and other Asian countries. Alaska did not have any plastic manufacturers until 1985.

Some of the plastic particles made by the producers are accidentally lost in shipping accidents. Plastic materials are also dumped in the ocean by ocean-going vessels, fishermen, and others. The National Academy of Science estimates that over 300 million pounds of plastic are dumped in the ocean every year.

Plastic particles float on the surface of the water.

The currents of the Pacific Ocean move in a counter-clockwise direction southeast past Japan toward the California coast, northwest past British Columbia and southeast Alaska, then southwest past the Aleutian Islands.

Many seabirds, including shearwaters, storm-petrels, auklets, and puffins feed on small zooplankton and cephalopods that float near the ocean surface.

Zooplankton and cephalopods are, in general, too small to ingest plastic particles. They feed mainly on algae and smaller zooplankton.

THE PUZZLE:
Based on your knowledge of ecology, would you expect to find plastic in the stomachs of Alaska seabirds? Explain why or why not.

WHAT ECOLOGISTS HAVE PUZZLED OUT

Even though there were no plastic manufacturers in Alaska until 1985, plastic particles have been found in Alaska seabirds! Plastic particles have been found in the digestive tracts of 21 of the 37 species of Alaska seabirds examined. In some species, 40-50% of the birds examined had plastic in their digestive tracts! The puffins, auklets, storm-petrels, fulmars, and shearwaters that have the plastic particles feed mainly on crustaceans and cephalopods (squid) which are too small to ingest the plastic particles. Scientists do not know why seabirds are picking up the plastic, but hypothesize that the birds are mistaking the plastic particles for zooplankton or fish eggs. Different species of birds seem to pick up different kinds of plastic particles.

Alaska seabirds find and ingest the particles on their migrations through waters off Japan and California where plastic manufacturing occurs, and in some Alaska waters where plastic particles have become concentrated as a result of ocean currents. A visit to any outer coast beach of Alaska will quickly show that industrial plastic pollution is not the only source of the problem. The beaches are littered with plastic of all descriptions.

The plastic particle problem is just being recognized and appears to be a recent phenomenon, at least in Alaska. Parakeet auklets of St. Lawrence Island in the Bering Sea did not have any plastic particles in their digestive tracts in the mid-1960's. By the mid-1970's, 50% of the birds in the area contained plastic. The effects of the plastics on the seabirds are unknown. There is some evidence that seabirds with digestive tracts packed with plastic may have trouble digesting food, or may starve.

A recent report by the National Academy of Sciences indicated that worldwide, an estimated 1-2 million birds and 100,000 marine mammals may die each year as a result of plastic pollution, but this figure refers mainly to birds and mammals that become entangled in discarded or lost commercial fishing nets and lines.

References:

Day, R. H. 1980. The occurence and characteristics of plastic pollution in marine birds. Master's Thesis. University of Alaska. 111 pp.

Wehle, D. H. S. and F. C. Coleman. 1983. Plastics at sea. Natural History. February 1983. pp. 20-26.

MARINE LITTER IN ALASKA

"Nuts and Bolts to Organizing a Beach Clean-up" is available from Judie Nielson, Oregon Department of Fish and Game, Box 59, Portland, OR 97209.

"Trashing the Oceans," a 7 1/2 minute video produced by the National Oceanic and Atmospheric Administration (NOAA) is available for loan from Dolores Scott, Project Wild Coordinator, ADF&G, Division of Wildlife Conservation, P.O. Box 3-2000, Juneau, AK 99802.

For a complete list of resources to teach about marine litter, contact: Joaqlin Estus, Division of Governmental Coordination, P.O. Box AW, Juneau, AK 99811 (465-3562).

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ALASKA FOOD CHAIN AND FOOD WEB EXAMPLES

Six food chain examples for forest, tundra, wetland and ocean are shown in bold letters. Make food webs by using the other foods of each living thing (listed in small letters below its name) to find other interconnections. Use with the activities in Lessons 1, 2, and 3 of this unit. Use information provided on the back of the photo poster (from this and Alaska Wildlife Week Units 1, 2, & 3--check your library). See the 1984 unit for more background on wetland food webs.

	PRODUCER	HERBIVORE	CARNIVORE 1	CARNIVORE 2	DETRITIVORE
FOREST	1. White Spruce	**Red Squirrel** berries, mushrooms	**Marten** voles, bird eggs		**Mushroom** any dead plant
	2. Willow	**Snowshoe Hare** birch, grass, fireweed	**Lynx** voles, squirrels		**Raven** any dead animal
	3. Grass Seeds	**Red-backed Vole** berries, fireweed	**Boreal Owl** flycatcher, woodpecker		**Fly** any dead animal
	4. Lingonberry	**Pine Grosbeak** spruce and birch seeds	**Goshawk** squirrel, flycatcher, woodpecker		**Bacteria** any dead thing
	5. Fireweed	**Moth**	**Alder Flycatcher** flies, beetles	**Merlin** pine grosbeak	**Beetle** any dead animal
	6. White Birch	**Bark Beetles** spruce	**Downy Woodpecker** moth, berries		**Shelf Fungus** any dead wood
TUNDRA	1. Lichen	**Caribou** dryas, willow, sedge	**Brown Bear** sedge, grass, blueberry		**Bacteria** any dead thing
	2. Dryas	**Dall Sheep** willow, sunflower, sedge	**Wolf** caribou, marmot		**Raven** any dead animal
	3. Willow	**Redpoll** willow, sunflower, sedge	**Arctic Fox** singing vole, any dead animal		**Flies** any dead animal
	4. Grass	**Singing Vole** sedge, sunflower, dryas	**Short-tailed Weasel** redpoll		**Springtail** any dead plant
	5. Sunflower	**Butterfly** blueberry, mountain avens	**Golden Plover** flies, springtail, blueberry	**Jaeger** redpoll, vole	**Bacteria** any dead thing
	6. Sedge	**Marmot** grass, sunflower	**Wolverine** fox, any dead animal		**Mushroom** any dead plant
	7. Blueberry	**Willow Ptarmigan** willow, sedge	**Golden Eagle** marmot, weasel, sheep (lamb only)		**Fly** any dead animal
WETLAND	1. Algae	**Water Fleas** dead plants, protozoans	**Stickleback** midge, rotifer	**Common Loon** frog	**Bacteria** any dead thing
	2. Pondweed	**Pintail** algae, seeds of sedges	**Peregrine Falcon** phalarope		**Rotifer** any dead producer, protozoans
	3. Algae	**Midge** algae, dead plants	**Wood Frog** flies, mosquitos	**Sandhill Crane** stickleback, sedges	**Water Flea** any dead producer, rotifer
	4. Sedges	**Muskrat** pondweed	**Mink** stickleback, phalarope		**Bacteria** any dead thing
	5. Willow	**Moose** willow, sedge	**Wolf** muskrat, pintail		**Flies** any dead animal
	6. Algae	**Mosquito Larvae** protozoans	**Red Phalarope** midge, water flea, rotifer	**Parasitic Jaeger**	**Protozoans** any dead material, algae
OCEAN	1. Green Algae	**Sea Urchin** kelp	**Sea Otter** crab, sculpin, sea star		**Tanner Crab** any dead animla
	2. Kelp	**Snails** green algae	**Sea Star** sea urchin, sea cucumber, shrimp		**Flatfish** any dead animal, snails, fish
	3. Diatom (algae)	**Amphipod** other algae, kelp	**Sculpin** shrimp, sand lance	**Sea Anemone** sand lance, snails	**Shrimp** any dead material
	4. Sea Grass	**Brant** green algae	**Bald Eagle** herring, guillemot, any dead animal		**Marine Worm** any dead plant, algae
	5. Brown algae	**Copepods** other algae, sea grass	**Sand Lance** amphipod, euphausids	**Pigeon Guillemot** sculpin, herring	**Sea Cucumber** any dead thing
	6. Red algae	**Euphausids** other algae, diatoms	**Herring** copepods, sand lance	**Harbor Seal** sand lance, flatfish	**Gull** any dead animal

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HUMAN ACTION CARDS - FOREST

Some people cut down trees to get wood to heat their homes.	Some people cut down trees in order to make clearings for farms and to build cities.	Some people leave papers, cans, plastic, and other trash in the forest.
Some people are careless with fires and cause forest fires.	Driving cars around and burning fuel puts a kind of smoke, or pollution, in the air that can kill trees.	Some people cut down, or harvest, trees so that we have wood to use in making paper.
Some people drive cars, trucks, or three-wheelers through forests. This kills some of the trees and other plants.	Some people camp in the forest.	Some people build houses in the forest.
Some people make a lot of noise in the forest and scare forest animals.	Some people mine for metals in the forest. They have to remove the trees and soil.	Some people build roads in the forest. They have to cut down trees to do this.
Some people pick up litter that others left in the forest.	Some people kill all the animals they see.	Some people break off the branches of trees.
Some people plant trees in areas where the trees have been cut down or cleared.	Some people cut down trees to make totem poles, build canoes, or make furniture.	Some people cut off the bark of trees in order to get the materials needed for making beautiful baskets.
Some people are very careful about their uses of paper, and always recycle it.	Some people only drive their vehicles on roads or trails so they won't harm growing plants.	Some people are always careful with their campfires, and always put out all the sparks and coals. This helps prevent forest fires.
Some people put out forest fires started by careless people.	Some people use special kinds of stoves and cars that do not pollute the air as much as other kinds.	Some people are quiet in the forest, and always careful. They try not to break off tree branches, or trample the plants.

HUMAN ACTION CARDS - WETLANDS

Some people drain wetlands so they can farm crops or raise livestock.	Some people place gravel in wetlands so they can have a place to build a house.	Some people leave papers, cans, plastic, and other trash in wetlands.
Some people get rid of polluted water by draining it into wetlands.	Some people leave plastic fishing line along the shore of rivers where animals can get tangled up in it.	Some people don't obey harvest laws and kill all the animals they see.
Some people drive cars, trucks, or three-wheelers across wetlands. This kills some of the plants and may cause gullies and ditches.	Some people gather berries or leaves to make tea in wetlands.	Some people canoe or kayak down rivers and camp along the shores.
Some people make a lot of noise in wetlands and scare wetland animals.	Some people dig ditches in wetlands which drain some parts of the wetland.	Some people build roads across wetlands. They have to put gravel down and birds no longer nest there.
Some people drive their vehicles on wetlands, leaving permanent tracks.	Some people dam rivers to generate electricity. Downstream wetlands dry up.	Some people use streams for drinking water. In times of drought, the streams dry up and fish die.
Some people cut down trees carelessly so they fall across streams and crush streambanks and plants.	Some people fish and hunt in wetlands.	Some people get together to plan how their town will grow and avoid building in wetlands as much as possible.
Some people are very careful about their uses of water and use as little as possible.	Some people only drive their vehicles across wetlands during winter when snow protects the plants.	Some people plan roads so they go don't have to go across wetlands.
Some people use water to mine for gold and put muddy water back into streams that can clog the gills of fish.	Some people use special kinds of stoves and cars that do not pollute the air as much as other kinds.	Some people are quiet in wetlands, and always careful. They try not to break off trample plants or scare wildlife.

APPENDIX

HUMAN ACTION CARDS - TUNDRA

Some people leave papers, plastic, and other trash in the tundra.	Some people build houses, factories, and roads on the tundra. More noise and activity disturbs wildlife.	Some people spray pesticides to get rid of mosquitoes. There are fewer insects and fewer insect-eating birds.
Some people burn gas, oil, and coal to make electricity. Acid rain forms, killing lichens and soil bacteria.	Some people obey harvest regulations for animals such as geese in lowland tundra or goats in the alpine tundra.	Some people put up fences on the tundra. Animals that migrate, like caribou, overgraze their range and many starve.
Some people ignore hunting regulations and kill every animal they see. Musk-oxen, caribou, and goats become scarce.	Some people drive vehicles across the tundra during summer, crushing tundra plants. The permafrost melts and the ground sinks.	Some people drive vehicles across the tundra only during winter when the ground is frozen and there is enough snow to protect plants from being crushed.
Some people gather berries and other food on the tundra.	Some people hunt caribou on the tundra and catch fish in tundra streams.	Some people build oil wells and gravel pads on the tundra. Some birds no longer nest in the area.
Some people strip the plants and soil from the tundra to mine gravel and minerals	Some people are careful to never leave plastic or wire on the tundra which animals could get tangled up in or eat by mistake.	Some people get together to plan how their town or village will grow and use as little of the tundra as possible.

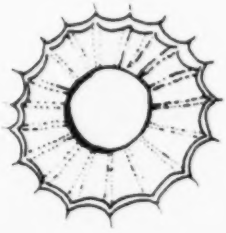
ECOSYSTEM INVESTIGATIONS -- Monerans and Protists

LOOK FOR SIGNS--All individual monerans and many protists are microscopic, but en masse, it is possible to see some kinds. A scum on the surface of the water is a good sign that bacteria or blue green algae (or cyanobacterium) are present. A greenish or brownish slimy coating on an old log or on a rock is evidence of cyanobacterium or algae. Many bacteria help to decay dead leaves. Look for a dead leaf that has decayed so that all that is left is a fine meshwork of veins. That is evidence of bacteria at work. Make a list of the evidence of bacteria and protists that you find.

LOOK FOR THE ORGANISMS--In order to see microscopic organisms, you need to use a microscope. Collect samples of soil, water, moss, tree bark, and dead leaves. Place a tiny bit of each one on a microscope slide, and add a drop of water. Examine the slide under high power. Can you see anything that looks like any of the diagrams on the poster? Decide which group each likely belongs to. (Some are nearly impossible to classify unless you have a powerful electron microscope.) Draw pictures of these microscopic organisms in your booklet on the appropriate pages.

ASK EXPERTS--A microbiologist is a scientist who studies microscopic living things. You might find one at a university, offices of the State of Alaska Dept. of Environmental Conservation, or U.S. Environmental Protection Agency, or local health service. You could ask them about the bacteria, cyanobacterium, algae and other protists of your area. They might have pictures or samples of some they could show you.

HOW ABUNDANT ARE THEY-- Count the number of organisms on each slide you prepared and record this. Consider how many slides of each material you could make from a tablespoon of that material . (You could measure out a tablespoon of soil and find out how many slides you could make out of it.) Multiply the number of monerans and protists on a single slide times the number of slide samples in a tablespoon to estimate how many microscopic organisms are in a tablespoon of soil.

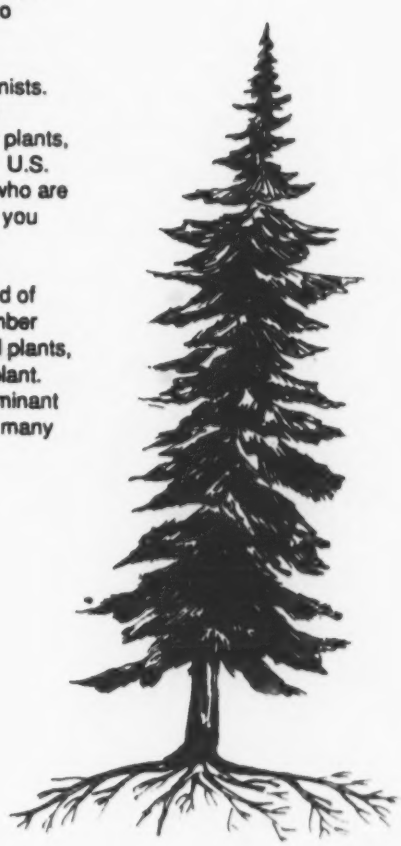


LOOK FOR SIGNS--Depending on the time of year and where you are, many plants may be dormant--so you won't see their leaves, flowers, or even stems. You might find it interesting to find out what plants are in the soil as seeds. Take a small sample of soil back to the classroom, or collect a variety of seeds from the ground and take them along with the soil. Put the soil in an open container (an old milk carton, for example). Then, water the soil well, cover it with plastic and place it in a sunny spot. Watch your mystery garden closely for 2-3 weeks and record what happens.

LOOK FOR THE ORGANISMS--Plants are probably the easiest living things to observe and study. You can see them easily and they can't move away. But it is easy to overlook the number and variety of plants unless you look carefully. Be sure to look for mosses, ferns, and horsetails as well as conifers and flowering plants (see the poster if you don't know what these are). How many different kinds of plants can you find in a 1m x 1m area. Draw pictures of each of the plants you find. Be sure to notice the edge of the leaves and their shape. Try to identify the most common plants by using a field guide to plants.

ASK EXPERTS--Scientists who study plants are called botanists. You can find botanists at universities and at the State Dept. of Forestry and U.S. Forest Service. Most biologists can identify plants, so you might check with the Alaska Dept. of Fish and Game or U.S. Forest Service for help. Local nature clubs may have people who are interested in, or study plants, too. They might be able to help you identify some of your plants.

HOW ABUNDANT ARE THEY-- Count the number of each kind of plant that you found in your 1 m x 1 m area and record this number next to the drawing of that plant. Be careful to count individual plants, not every individual leaf or stem. Count a moss clump as one plant. Which plants are the most abundant. These are called the dominant plants. Add all the numbers of plants together to find out how many plants were in your 1m square area. Record your answer.



ECOSYSTEM INVESTIGATIONS - Fungi

LOOK FOR SIGNS--Most fungi help to decay or rot dead organisms and waste materials. Look for evidence that a log is decaying, or leaves are rotting away. Record any evidence of fungi that you see.

LOOK FOR THE ORGANISMS--You are likely to find fungi anywhere that dead plants are found. They are more likely to be growing in a moist spot. Look for old dead trees. Examine an old log carefully. Dig into the leaf litter on the ground. You are looking for anything that is spongy (mushrooms and shelf fungus), that looks like dust (a mold), or like a clear or milky jelly (a slime mold). Examine any that you find with a hand lens. If you find a mushroom or a shelf fungus, look at it carefully; try to find out what it is growing on and if it has any parts hidden from view. A special type of fungi grow together with certain algae and cyanobacterium to form lichens. These can be found just about anywhere. Look for them on the surface of rocks, on tree branches, and on the ground. An easy way to recognize a lichen is that it is brittle and easy to break if it is dry, but will gradually become flexible if you wet it. Draw pictures of each of the kinds of fungi that you find.

TRY TO GROW SOME FUNGI--Many kinds of fungi are hard to find except during certain seasons when they send out fruiting parts that produce their spores. A mushroom is an example of a fruiting part of a fungi. The fungi is there growing underground all year round but you may only see mushrooms in late summer. You may be able to grow some of the fungal spores that are around by making a fungi garden (see the diagram below). Let the fungi garden set for a day so that spores in the air can fall into it. Then put your "fungi garden " garden plot in a moist warm place and see if anything grows.

ASK EXPERTS--A mycologist is someone who studies fungi. You might find a mycologist at a local university.

HOW ABUNDANT ARE THEY? Count the number of fungi that you can see in a 50 cm square area. (Since some fungi may only be found in certain seasons, you might want to come back and take the same measurement at different times of year.)

HOW TO
MAKE A FUNGI GARDEN

1. Mix up a growing medium. Boil 1 quart of water. Add 1 1/2 tablespoons of malt and 1 package of unflavored gelatin. Stir constantly until mixture boils. Boil 1 minute.

2. Pour into jar or dish. Cover well with plastic and let sit until mixture gels.

3. Set the dish of growing medium out in your plot. Remove the cover and leave it for 24 hours.

4. Replace the plastic cover.

5. Place the entire unit in a warm moist place and observe what happens during the next week.

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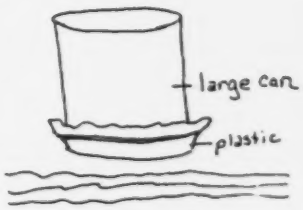
ECOSYSTEM INVESTIGATIONS: Animals in the Water

LOOK FOR THE ORGANISMS--You can make the underwater viewer shown at right with a coffee can and some clear plastic. Put it on the water surface and look under water for fish, insect larvae, worms, or other creatures. Pick up rocks and look on the underside of them. (Be sure to put them back in the same place so the animals that live there will still have their home.)

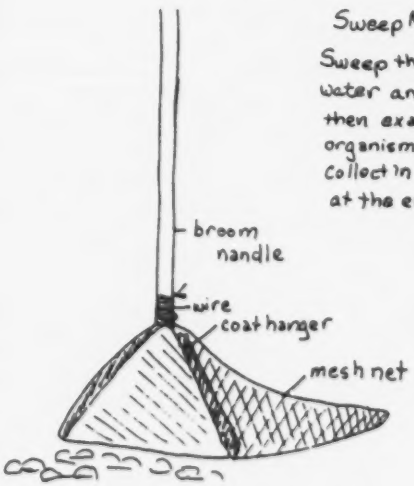
CATCH THE ORGANISMS--The diagrams below show a variety of ways that you can catch animals that live underwater in order to look at them more closely. Be sure to return them to their homes after examining them. Check your library for books on identifying insects and other invertebrates.

ASK EXPERTS-- You can find fisheries biologists at your local Alaska Dept. of Fish and Game or U.S. Fish and Wildlife Service office. Since fish eat the other kinds of living things in the water, fisheries biologists will likely be able to help you identify the insects and other invertebrates, too.

MEASURING THE ABUNDANCE OF AQUATIC INVERTEBRATES--Measure the volume of water, or bottom sediment that you collected. Then, count the number of organisms in the sample. You might also count the number of organisms found per rock examined. Record the number of organisms located per unit area.



Underwater Viewer

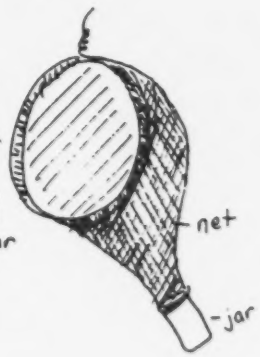


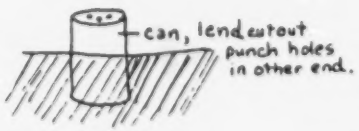
Kick Sampler

Place on bottom of a stream. Kick stream bottom gently. Examine.

Sweep Net

Sweep through water and then examine organisms that collect in the jar at the end.





Core Sampler

Push down into bottom of stream or pond, then pull up. Sort through sample.

*Check the 1984 Alaska Wildlife Week, Unit 2. Water, Wetlands, and Wildlife for more information and instructions on making and using some of the above sampling equipment.

ECOSYSTEM INVESTIGATIONS -- Animals in the Soil

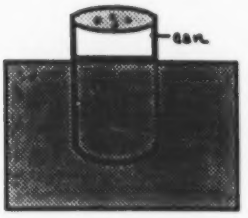
LOOK FOR SIGNS--Many kinds of animals, including insects, snails, spiders, isopods, and small mammals live underground. If you just glance at an area you may not notice they are present. Examine your 1m x 1m area carefully. Look for small holes or tunnels into the ground, droppings, or leaves that seem to have a bite taken out by a small animal. Record any evidence of animals that you find.

LOOK FOR THE ORGANISMS--Use an empty can as a sampling tool. Press the open end into the soil until the can is at least half full of soil. Mark the can so you will know later how much soil you collected. Take the soil back to the classroom in a plastic bag. You can place it in a tray and sort through it. Or, set up the Berlyse funnel shown on the right. Leave the light on overnight. Many of the living things in the soil will move away from the warm bright light and fall into the collecting bottle. Draw pictures of the organisms you find. Can you identify any of them? Compare them to drawings on the poster.

ASK EXPERTS--An invertebrate biologist is a scientist who studies animals that do not have backbones (like insects, mollusks, crustaceans, and worms). Entomologists are scientists who study insects. Either of these kinds of scientists could probably tell you some of the organisms that are found in the soil and they might be willing to help you identify the ones you find. You might find such a scientist at a local university, an office of the U.S. Dept. of Agriculture (includes the U.S. Forest Service), or the State of Alaska, Division of Agriculture.

HOW ABUNDANT ARE THEY? 1. Find out how much soil you collected. (Fill your sampling can up with water to the same level as the soil sample. Measure how much water this is in milliliters using a graduated cylinder.) One milliliter equals 1 cubic centimeter. 2. Count the number of organisms you found in the sample. By dividing this number by the number of cubic centimeters of soil you sampled, you can find out how many soil organisms there are per cubic centimeter. Record this in your ecosystem book.

Soil Sampler



Berlyse Funnel

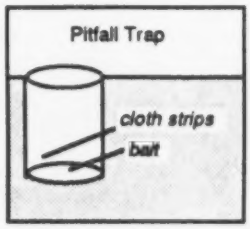
LOOK FOR SIGNS--Often, it isn't easy to see the birds and mammals that live in an area. Many move around over large areas and try to stay hidden. But they leave signs of their presence. Look for animal droppings, tracks, hair or feathers, plants that have been nipped or browsed, nests or dens. A book that will help you identify animal sign is A Field Guide to Animal Tracks by Olaus J. Murie. Record any evidence of birds or mammals that you find.

LOOK FOR THE ORGANISMS--The most important thing to remember when you are looking for birds and mammals is to be quiet--talking and moving around noisily will scare them away. Sit quietly, listen and watch. Try to visit the site in early morning or late evening. Bring binoculars or a spotting scope, if you can. Draw pictures or make a list of all the birds and mammals you see.

ASK EXPERTS--Wildlife biologists study birds and mammals. An ornithologist studies birds and a mammalogist studies mammals. You might find these kinds of scientists at your local Alaska Dept. of Fish and Game or U.S. Fish and Wildlife Service office. Or, check with local nature clubs; members of organizations like the Audubon Society may know a lot about the birds and mammals of your area. Sportsmen's groups are also a good source of information; trappers and hunters may know a lot about some of the mammals in the area. State and federal park departments may also have biologists or naturalists on their staff.

CHECK REFERENCES--A good way to find out more about the wildlife in your area is to check books about wildlife, like the Guide to Birds of Alaska by R.W. Armstrong, and A Guide to the Mammals of North America by Burt and Grossenheider. Make a list of the birds and mammals that occur in your area according to the maps and information in these, or similar books. Why do you think you didn't see most of these in the area you studied.

LIVE TRAPPING-- You can live trap shrews and other small mammals by making pitfall traps. Dig a small hole in the ground and set in a small coffee can so that its top edge is even with the ground. Bait with a mixture of peanut butter, bacon fat, and oatmeal. Be sure to put cloth strips or cotton in the bottom of the can so any animal you capture can make a nest and stay warm. Checkyour traps at least every 12 hours. If traps are checked less frequently, the animals you catch may die.



HOW ABUNDANT ARE THEY? Measure a 10m x 10m area, then count the number of each species that you find in that area. Count any sign you see as 1 animal, unless it is clear that there was more than one. For example, if you found 2 sets of moose tracks--one much larger than the other, that would show that there were two moose in the area. But if you found two sets of tracks, both the same size, it could have been the same animal passing through twice. Compare your estimate of bird and mammal abundance with other groups. Could you get a better estimate of abundance using everyone's estimates? Biologists spend a lot of time and money trying to develop accurate ways of counting birds and mammals. You may want to discuss this topic with local experts and find out how they count, or census, wildlife.

[redacted]

Name _____

Notes on the _____ (group of living things) **of** _____ (place studied).

_____. There were ____ in _____.	_____. There were ____ in _____.	_____. There were ____ in _____.
_____. There were ____ in _____.	_____. There were ____ in _____.	_____. There were ____ in _____.
_____. There were ____ in _____.	_____. There were ____ in _____.	_____. There were ____ in _____.
_____. There were ____ in _____.	_____. There were ____ in _____.	_____. There were ____ in _____.

We observed _____ different kinds of _____ in our study area.
There were a total of _____ in the area (_____) we studied.

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APPENDIX

ETIQUETTE FOR WILDLIFE WATCHERS

Wildlife watchers sometimes unintentionally harm wildlife, ruin opportunities for others to enjoy wildlife, and occasionally place themselves in danger. To avoid these situations, use the following guidelines carefully whenever you observe or photograph wildlife.

MINIMIZE DISTURBANCE OF WILDLIFE

Step softly and quietly while observing animals, replace rocks or logs after looking underneath (to keep the roofs on animals homes), handle animals gently, fill in holes after looking for clams (to prevent suffocation of the animals next door) and don't take live animals or plants away from their homes.

So that other children can enjoy the area, too. Discourage personal collections of any natural items, living or nonliving. Limit collection to educational purposes such as art projects or aquarium study--and return any living animals to their natural habitats as soon as possible. For classroom specimens, preserve only those animals already dead.

Observe animals from a safe distance. Use binoculars, spotting scopes, and telephoto lenses to get a closer look. If an animal shows signs of being crowded or disturbed, sit quietly or move slowly away.

SIGNS YOU ARE TOO CLOSE:

MAMMALS
- Head raised high, ears pointed in direction of observers
- Skittishness-jumps at sounds or movements
- Animal moves away or lowers head, ears back in preparation for a charge,
- Erect hairs on neck and shoulders

BIRDS
- Head raised, looking at observers
- Skittishness
- Excessive preening, or pecking at dirt or foot; bill wiping
- Alarm calls, repeated chirping and chipping
- Distraction display-broken wing, or tail spread

Move slowly, allowing the animal to keep you in view. Avoid sneaking up on or surprising animals.

Limit the time you spend at or near a nest to 5-10 minutes. Do not visit nests during bad weather. Do not disturb the plants around the nest, or handle eggs

or young. Keep far enough away from nesting colonies that you don't flush the birds.

AVOID DANGEROUS WILDLIFE

Familiarize yourself with bear safety. Bears occur in almost every habitat in Alaska. A pamphlet entitled "The Bears and You," available free from the Alaska Department of Fish and Game, provides excellent tips for avoiding bear attacks.

Always keep a good distance between yourself and cow moose with calves. A cow may charge on little prevocation and her flying hooves can seriously injure or kill a person.

Encourage students to leave the schoolyard, forest, river or wetland cleaner than when they arrived.

By working together and following these simple rules we can all enjoy Alaska's abundant wildlife today and tomorrow.